

ELECRAFT KH1 PROGRAMMER'S REFERENCE

Rev. A2, Dec 14, 2023

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OVERVIEW

The KH1 supports 100% remote control. This feature is primarily intended for updating firmware and for automated factory testing (see the Elecraft KH1 Alignment Manual for manual procedures). That said, it could also be used to operate the radio using custom software, in applications ranging from “HF-Pack Lite” to putting the KH1 at an antenna feedpoint.

KH1 commands consist of one or two letters followed by zero or more parameters. There is some overlap with the command sets from other Elecraft transceivers. But in general the KH1 command set is more limited.

COMPUTER INTERFACE

The KH1 can be controlled through the KEY/DATA jack using a KXUSB cable and a terminal emulator or software application. *MENU:KEY JACK* must be set to RS232. The serial interface baud rate is 9600b (fixed).

When the KEY/DATA jack is being used for remote control, it is not available for use with a keyer paddle or hand key. However, there's a host command (HK) that can be used to simulate CW keying, as if using a hand key. This is used during manual or factory alignment procedures, but it could be used for CW transmission, replacing the key or keyer paddle. The software application would be responsible for ASCII to CW translation and/or could provide a keying input device.

COMMAND TYPES

There are three categories of KH1 remote-control commands: UI emulation, ID/firmware load, and parametric. There's also a "help" command that lists available commands in terse form (H).

EMULATION: The EN (encoder), DS (display), HK (hand key), MN (menu), and SW (switch) commands emulate the UI, in a manner that is completely context-dependent, like the panel controls themselves. These commands can be used to access menu entries or emulate radio operation, in most cases providing a way to extend the radio's remote control capabilities in lieu of other specific parametric commands.

Examples: A GET of the filter number could be created using SW1H; (bring up RCVR functions) followed by DS1; (read line 1 of the display). A SET of filter number 2 could be effected by then sending SWT2;.

ID/FIRMWARE LOAD: This group includes I (rig ID), LD (firmware load), RV (firmware rev.), and SN (serial number). "I;" returns "KH1;" in the main app (upper case), while the boot loader responds to "I" with "kh1" (lower case). This allows KH1 Utility to tell whether it's talking to the boot loader or the main app. "RV;" returns "RVnn.nn;" (firmware revision). "LD;" initiates firmware loading and is only used by KH1 utility. SN can be used by anyone to get the serial number. It is used by the factory to set the serial number, which requires a non-public password.

PARAMETRIC: Commands such as AG (AF gain), MD (mode), and FA (frequency), behave like similar commands on the KX2, KX3, etc. In most cases only SETs are provided, since the KH1 doesn't have "AI" capability (auto-info) and is not intended to support apps like HRD, etc. If required, a GET can be simulated by using a display read command (DS command). For example the operating frequency could be obtained by reading line 1 of the LCD.

COMMAND LIST

All commands and responses are terminated by a semicolon.

AG (AF Gain; SET only)

FORMAT: AGnn; where <nn> is 00-30

NOTE1: The AF gain value is stored separately for phones and speaker.

NOTE2: AF gain can be incremented/decremented using the ENAU/ENAD commands.

DS (Display Text; GET/SET)

FORMAT: DSls; where:

<l> = '1' (line 1, or upper row) or '2' (line 2, or lower row)

<s> = Up to 16-char string (string is returned for GET, and supplied for SET)

NOTE1: The DS SET string is flashed for about 1.5 seconds. Use subsequent DS SETs to keep the flashed string on the display longer.

NOTE2: The LCD supports 8 special characters, some of which change depending on the radio's operational context. For a GET, the host app must translate these to suitable characters within the host's display environment. For a SET, the host app must embed low-hex ASCII values for special characters that make sense in the KH1's context. List of characters and contexts TBD.

EN (Encoder Emulation; SET only)

FORMAT: ENed; where:

<e> = encoder: 'A' (AF gain) or 'V' (VFO)

<d> = direction: 'U' (up/clockwise) or 'D' (down/counter-clockwise)

FA (VFO Frequency; SET only)

FORMAT: FAf; where <f> is in 10 Hz units (e.g. 1400000 = 14000.00 kHz)

H (Help; GET only)

FORMAT: H; Responds with terse help information.

HK (Hand-Key Emulation; SET only)

FORMAT: HKm; where m == 1 for key-down, and 0 for key-up.

I (ID; GET only)

FORMAT: I; Responds with "KH1;".

NOTE: If the radio is in the boot loader, it responds to "I" with "kh1".

LD (Firmware Load; SET only)

FORMAT: LD; Jumps to boot loader.

LG (Log Dump; SET only)

FORMAT: LGn; where n = 0 (dump), 1 (stop), 2 (continue), 3 (erase).

LOG DUMP OUTPUT: The log dump includes the following entities:

Upper-case text (transmitted)

Lower-case text (sent by the operator in TX TEST mode, e.g. for QSO notations)

Time stamps: <CR/LF>{YYMMDD-HHMM-BBMM} (date, time, band/mode)

Message play tag: [Mn] where n is 1-6

NOTE 1: Time stamps are sent once per minute while sending.

NOTE 2: During dumps, no GET commands should be sent to the KH1, as the results will end up embedded in the log text stream. SETs are OK (e.g., LG1/LG2 to stop/continue a dump).

NOTE 3: Uppercase log text was transmitted. Lowercase log text was entered as a NOTE (i.e. after tapping MSG) or during TX TEST mode.

NOTE 4: Dump and Erase can also be accomplished using the KH1's LOGGING menu entry.

MD (Operating Mode; SET only)

FORMAT: MDn; where n = 0 (CW), 1 (LSB), 2 (USB), 4 (RTTY).

NOTE: In SSB modes, the KH1 operates cross-mode (CW transmit, SSB receive). SSB receiving operators hear the KH1's CW at a 700 Hz pitch.

MN (Menu Open by Name; SET only)

FORMAT: MNsss; where <sss> is a short-form menu ID string. See list below. The target menu entry is unlocked if applicable. The menu can be exited by emulating a tap of the [x] field for the given menu entry. In most cases this is switch 4, so: "SW4T;".

NOTE 1: These 3-characters ID strings are also used to identify programmable switch functions in the associated PFn display fields.

NOTE 2: Some menu parameters can be changed using the **MP** command (see below).

<u>ID</u>	<u>MENU ENTRY</u>
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AGC	ADJ AGC V
-----	-----------

BFO	ADJ BFO
-----	---------

BIA	ADJ BIAS
-----	----------

BPF	ADJ BPF	MP command applies
-----	---------	--------------------

DAY	ADJ DATE
-----	----------

OSC	ADJ OSCID
-----	-----------

PWR	ADJ PWR	MP command applies
-----	---------	--------------------

REF	ADJ REF
-----	---------

RTC	ADJ RTC
-----	---------

SMT	ADJ SMTR
-----	----------

SWR	ADJ SWR
-----	---------

TIM	ADJ TIME
-----	----------

WTM	ADJ WMTR
-----	----------

ATM	ATU MODE
-----	----------

ATP	ATU PARAM
DSP	DISP MODE
EE	EE INIT
F/W	FIRMWARE
IAM	KEY IAMB
PDL	KEY JACK
WGT	KEY WGHT
LOG	LOGGING
RPT	MSG RPT
PAN	PAN MODE
SPN	PAN SPAN
THR	PAN THR
PF1	PF1 FUNC
PF2	PF2 FUNC
PF3	PF3 FUNC
CLR	RIT CLEAR
S/N	SERIAL NR
SWT	SW TONES
TXT	TEXT DEC
VBAT	VBAT
FST	VFO FAST

MP (Menu Parameter; GET/SET)

FORMAT: MPnnn; where <nnn> is a decimal value from 0-999.

This command must be preceded by an MN command that opens an applicable entry (it will be unlocked). These menu entries include ADJ BPF and ADJ PWR.

RV (Firmware Revision; GET only)

FORMAT: RV; Response format: "RVxx.xx;"

SN (Serial Number; GET only)

FORMAT: SN; Response format: "SNnnnnnn;"

ST (Status; GET only)

FORMAT: ST; Response format: "STnsa;" where:

<n> = # of self-test errors since power-up

<s> = "S" if this unit has an assigned serial number, otherwise "s" (lower-case)

<a> = "A" if an ATU module is found, otherwise "a" (lower-case)

NOTE: The ATU presence test is independent of the MENU:ATU MODE setting.

SW (Switch Emulation; SET only)

FORMAT: SWnt; where:

<n> = '1'-'4' (regular pushbutton switches) or '5'-'6' (encoder switches)

<t> = 'T' (tap) or 'H' (hold)

TXL/TXH (Transmit Limits; GET only)

FORMAT: TXLn; or TXHn; where “L” returns lower limit, “H” returns upper limit,
and <n> is 0..4 for 40..15 meters. Reponse: TXLnFFFF; where FFFF is limit in kHz.

CHANGE HISTORY

Rev. A, Oct. 9, 2023: Added **MP** command.

Rev. A1, Oct. 27, 2023: Added **ST** and **TXL/TXH** commands.

Rev. A2, Dec. 14, 2023: Changed short-hand notation for ADJ DATE menu entry to “DAY” (was “DAT”). Added **LG** command (log dump).